PSYCHOSOCIAL BARRIERS FOR WOMEN IN STEM PROFESSIONS: A SYSTEMATIC REVIEW

Autora: Lara Perez Climent

Tutora: Eva Cifre Gallego

Resumen

Las barreras psicosociales existentes en las personas son capaces de producir un impacto excesivamente negativo para las mujeres en el ámbito de las ciencias, tecnología, ingeniería y matemáticas (STEM). Y puede ser limitante tanto a la hora de elegir una carrera profesional, como al prosperar dentro de ella en el ámbito laboral, ralentizando o entorpeciendo el desarrollo óptimo de su trayectoria en el sector STEM. Por ello, se ha analizado, a través de una revisión sistemática basada en el método PRISMA, cuáles son los factores que podrían estar presentes de manera implícita y que de algún modo perjudica, dañan o desfavorecen la autopercepción de la mujer en el ámbito científico. Los resultados muestran tres factores principales que afectan o influyen la no elección de las STEM por parte de las mujeres: 1) Los estereotipos de género implantados en la población, como la asociación implícita entre las STEM y el sexo masculino, 2) La subrepresentación femenina existente en dichos campos, y la poca visibilidad que se le da a las nuevas generaciones de su presencia, 3) Los miembros de la familia que conviven con los estudiantes y el papel fundamental de la madre en el núcleo familiar. Por otro lado, los resultados obtenidos en relación con el progreso profesional, encontramos los estereotipos de los compañeros de trabajo hombres como la principal causa del malestar laboral de las mujeres y factor fundamental que hace que no se encuentren cómodas en ambiente poco amigable.

Palabras clave: STEM, género, estereotipos, barreras, mujer.

Abstract

Existing psychosocial barriers in society are capable of having an overly negative impact on women in science, technology, engineering and mathematics (STEM). And it can be limiting both in choosing a career path and in thriving within it in the workplace, slowing or hindering the optimal development of their STEM career path.

Therefore, the aim was to analyze, through a systematic review based on the PRISMA method, which are the factors that could be implicitly present and that in some way harm, damage or disfavor the self-perception of women in the scientific field. The results show three main factors that affect or influence the non-choice of STEM by women: 1) The gender stereotypes implanted in the population, such as the implicit association between STEM and the male sex, 2) The existing female underrepresentation in these fields, and the little visibility given to the new generations of their presence, 3) The family members who live with the students and the fundamental role of the mother in the family nucleus. On the other hand, the results obtained in relation to professional progress, we found the stereotypes of male co-workers as the main cause of women's work discomfort and a fundamental factor that makes them feel uncomfortable in an unfriendly environment.

Keywords: STEM, gender, stereotypes, barriers, woman.

Author: Lara Pérez Climent
Tutor: Eva Cifre Gallego
PS 1048

PSYCHOSOCIAL BARRIERS FOR WOMEN IN STEM PROFESSIONS: A SYSTEMATIC REVIEW

UNIVERSITAT JAUME I
2021/2022

INTRODUCTION

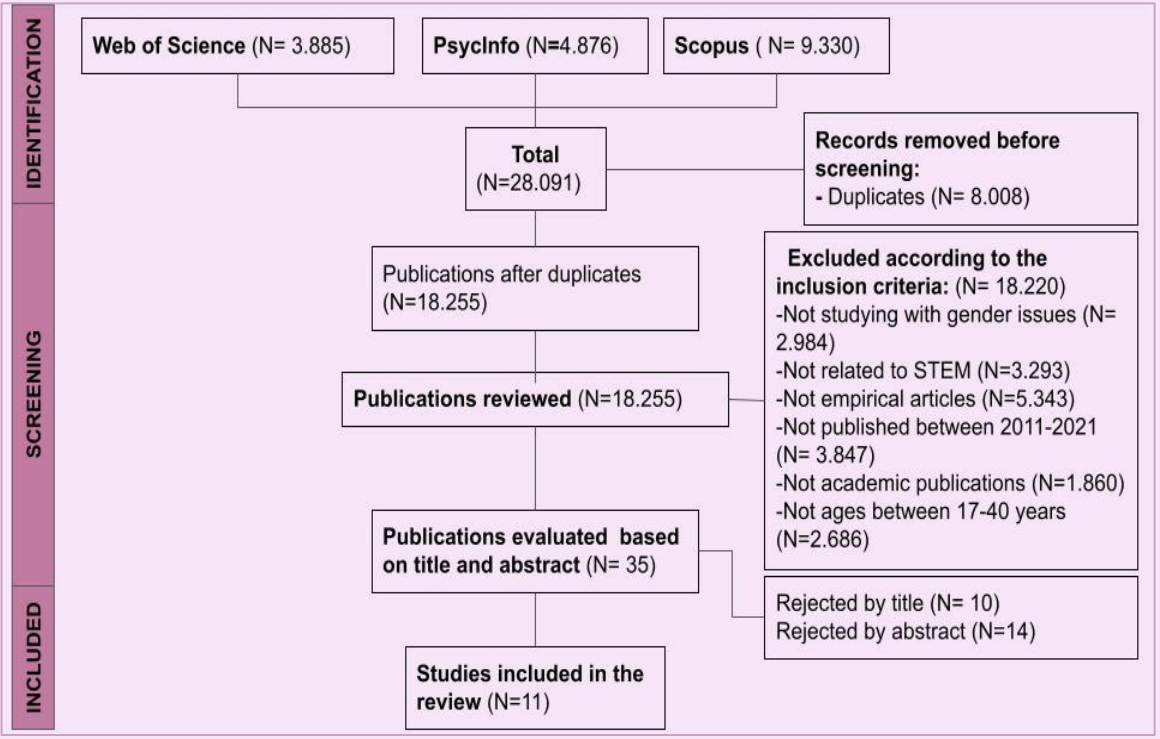
- STEM is the acronym for Science, Technology, Engineering and Mathematics.
- The STEM branches are on an upward course due to new technologies, what is required is greater participation in them.
- Underrepresentation of women in STEM fields.
- In Spain, the percentage of women choosing STEM careers is decreasing towards 13%-
- There are many different factors that explain this underrepresentation.

The **objective** of this study is to find out what barriers influence, slow down or hinder STEM careers in women.

METHODOLOGY

Keywords: STEM, gender, stereotypes, barriers, woman.

Based on the PRISMA method

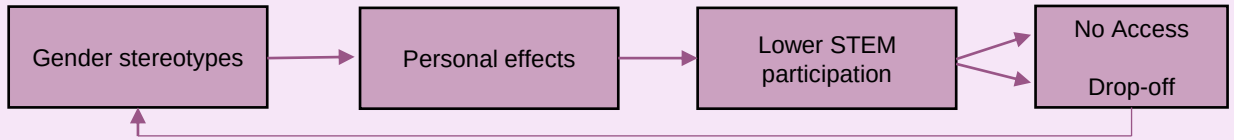


RESULTS

Before studying STEM
Working in STEM

	AUTHORN	SAMPLE	MAIN IDEAS
Implicit Association	Barberá et al. (2018)	N=**759** **F:**436 M:436	Gender associations: → -Engineering: Male - Psychology: Female
	Starr (2018)	N=**195** Female	Stereotypes + Implicit association *STEM = Male* → self-efficacy motivation
	Schuster et al. (2017)	N= **102** Female	Stereotype-activating situation → - Anticipated affection +: ↓ - Anticipated affection - : = → Professional aspiration ↓
Family	Rodríguez et al. (2020)	N= **1759** F:543 M:392	Family influence → Living with both parents / Mother presence → + impact on STEM chices
Low participation	Shaffer et al. (2013)	N=**122** F:56 M:66	Balanced condition | Unbalanced condition Mathematical performance F: ↑ H: ↑ | F: ↓ H: ↑ Threat-based preoccupation F: ↓ H: = | F: ↓ H: =
	Falk et al. (2017)	N=**448** F:99 M:349	Interest → M > F Trust: → M > F
Role model	Van Camp et al. (2019)	N= **72** Female	Reflective role model → Identity STEM: Pre: ↑ Post: ↑ / Belonging STEM: Pre: ↓ Post: ↑
	Stout et al. (2011)	Sample 1: 72 Female Sample 2: 101 Female	Exposure to female experts → Implicit attitudes mathematics + Exposure to male experts → Implicit attitudes mathematics −
Implicit stereotypes	Cyr et al. (2021).	N=**1247** F: 385 M: 862	Implicit male stereotypes ↑ : ↓ social ties < Social adjustment , < Professional commitment ,< Sense of identity
	Hall et al. (2019)	Sample 1: **269** F:148 M:121 Sample 2: **120** F: 64 M:56	Conversations with male peers Threatens social identity → Psychological exhaustion
	Block et al. (2018)	N=**263** F:145 M:118	> Implicit association *STEM = Male* → < Self-efficacy / < Lesservalue

CONCLUSIONS



Referencias

Akosah-Twumasi, P., Emeto, T. I., Lindsay, D., Tsey, K., & Malau-Aduli, B. S. (2018). A systematic review of factors that influence youths career choices—the role of culture. *Frontiers in Education* (3, p. 58).

Arteaga, F. (2018). La cuarta revolución industrial (4RI): un enfoque de seguridad nacional. *Documento de trabajo*, *12*, 2018.

Barberá, E., Candela, C., & Ramos, A. (2018). Elección de carrera, desarrollo profesional y estereotipos de género. *Revista de Psicología Social*, *23*(2), 275-285.

Barcelona, U. I. C., Jiménez, E., León, C., Lorda, E., Pardo, R., Agradecimientos, L. R., & Villà, J. (2020). CAPCIT *(Consell Assesor del Parlament sobre Ciència i tecnología)*. Boletín del CAPCIT.

Block, K., Hall, W. M., Schmader, T., Inness, M., & Croft, E. (2018). Should I stay or should I go? Women's implicit stereotypic associations predict their commitment and fit in STEM. *Social Psychology*, *49*(4), 243–251.

Buschor, C., Berweger, S., Frei, A. & Kappler, C. (2014). «Majoring in STEM—What accounts for women's career decision making? A mixed methods study». *The Journal of Educational Research, 107*(3), 167-176.

Cyr, E. N., Bergsieker, H. B., Dennehy, T. C., & Schmader, T. (2021). Mapping social exclusion in STEM to men's implicit bias and women's career costs. PNAS *Proceedings of the National Academy of Sciences of the United States of America*, *118*(40), 1-7.

Di Bella, L., & Crisp, R. J. (2016). Women's adaptation to STEM domains promotes resilience and a lesser reliance on heuristic thinking. *Group Processes & Intergroup Relations*, *19*(2), 184-201.

Falk, N. A., Rottinghaus, P. J., Casanova, T. N., Borgen, F. H., & Betz, N. E. (2017). Expanding women's participation in STEM: Insights from parallel measures of self-efficacy and interests. *Journal of Career Assessment*, *25*(4), 571-584.

Hall, W., Schmader, T., Aday, A., & Croft, E. (2019). Decoding the dynamics of social identity threat in the workplace: A within-person analysis of women's and men's interactions in STEM. *Social Psychological and Personality Science*, *10*(4), 542-552.

Requeni, A. (2021). La mujer en las carreras STEM: situación actual en España y factores críticos.

Rodríguez, K. C. A., Medina, D. E. M., & Crespo, P. F. (2020). Influencia familiar en la elección de carreras STEM (Ciencia, tecnología, ingeniería y matemáticas) en estudiantes de bachillerato. *Revista de Investigación Educativa*, *38*(2), 515-531.

Pérez Rivas, C. M. (2015). Estudio estadístico sobre el perfil de los alumnos de nuevo ingreso en la universidad.

Schuster, C., & Martiny, S. E. (2017). Not feeling good in STEM: Effects of stereotype activation and anticipated affect on women's career aspirations. *Sex Roles: A Journal of Research*, *76*(1-2), 40-55.

Shaffer, E. S., Marx, D. M., & Prislin, R. (2013). Mind the gap: Framing of women's success and representation in STEM affects women's math performance under threat. *Sex Roles: A Journal of Research*, *68*(7-8), 454-463.

Starr, C. R. (2018). "I'm Not a Science Nerd!" STEM stereotypes, identity, and motivation among undergraduate women. *Psychology of Women Quarterly*, *42*(4), 489-503.

Stout, J. G., Dasgupta, N., Hunsinger, M., & McManus, M. A. (2011). STEMing the tide: using ingroup experts to inoculate women's self-concept in science, technology,

engineering, and mathematics (STEM). *Journal of personality and social psychology*, *100*(2), 255-270.

UNESCO. (2019). Descifrar el código: la educación de las niñas y las mujeres en ciencias, tecnología, ingeniería y matemáticas (STEM) (consulta: 1 de julio de 2020)

Únete a la Alianza STEAM en el Día de la Mujer y la Niña en la Ciencia. (s/f). Gob.es. Recuperado el 17 de mayo de 2022, de https://www.educacionyfp.gob.es/prensa/actualidad/2022/02/20220209-alianzasteam.htm

Van Camp, A. R., Gilbert, P. N., & O'Brien, L. T. (2019). Testing the effects of a role model intervention on women's STEM outcomes. *Social Psychology of Education: An International Journal*, *22*(3), 649-671.